

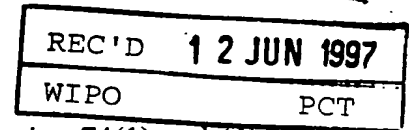


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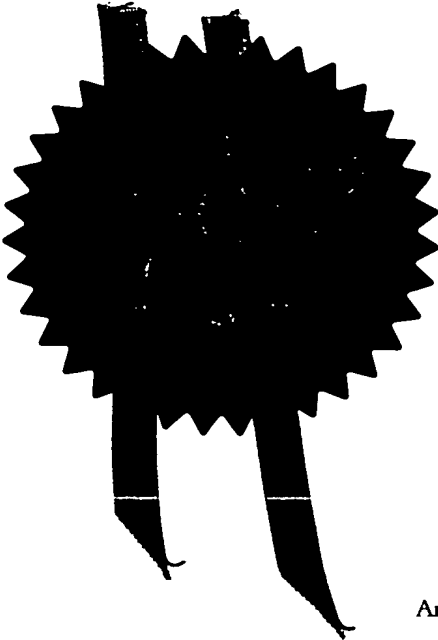
PRIORITY DOCUMENT

Signed

D J Wearmouth

Dated

19 MAY 1997



LIGHTING DEVICE

This invention relates to a lighting device.

5 In our co-pending application 9704423.4 there are described various aspects of an invention including as a first aspect a light outputting device comprising:
 a containment for housing an element for emitting light;
 a light conducting element aligned relative to the containment by means of
 the containment or an extension thereof the light conducting element having a light
 10 input region such as an end face of the light conducting element; and
 a light output region of the containment adapted for alignment with the light
 conducting element so that light generated by the emitting element is caused to pass
 by way of the light output region into the light input region.

15 Hereafter such a light outputting device is referred to as being 'of the type described'.

According to a first aspect of the present invention in a light outputting device of
 the type described wherein the containment comprises a member defining a passage
 20 in which the light conducting element is located, the passage having an inner end
 located within the containment serving as a wall of a chamber within the
 containment.

According to a first preferred version of the present invention the member is
 25 substantially opaque.

According to a second preferred version of the present invention or the first
 preferred version thereof the chamber serves to house the element for emitting light.

30 According to a third preferred version of the present invention or any preceding
 preferred version thereof the element for emitting light comprises one or more of
 the following: a resistive filament; an arc; a discharge device; a slid state emitter(pn
 junction), a coherent light source with means for light stimulation and amplification.

According to a fourth preferred version of the present invention or any preceding preferred version thereof the chamber serves to house, or has a boundary region serving to define, means for reflecting or refracting light emitted by the element for emitting light.

5

According to a fifth preferred version of the present invention or any preceding preferred version thereof the containment incorporates integral fins or is in good thermal exchange contact with a member incorporating fins; the fins serving to radiate heat generated by the element for emitting light and conducted to the fins by way of the containment.

10

According to a sixth preferred version of the present invention or any preceding preferred version thereof the containment includes a yet further passage whereby the chamber can be communicated with from outside the device to provide for varying the pressure in the chamber and/or for supplying the chamber with a gas or vapour.

15

According to a seventh preferred version of the present invention or any preceding preferred version thereof the containment comprises two parts demountably coupled to one another so that on being uncoupled they serve to expose the interior of the chamber. Typically the two parts of the containment each provide a path of electrically conducting material and when assembled the two paths are electrically insulated from one another and coupled to the element for emitting light to enable electrical power to be supplied to the element.

20

25

According to an eighth preferred version of the present invention or any preceding preferred version thereof the containment includes a further passage for conducting means for supplying electrical power to the element for emitting light. The further passage can extend axially along, or radially from, the device.

30

Exemplary embodiments of the invention will now be described with reference to the accompanying drawing of light emitting devices of which:

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form.)

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

BAILLIE/2

2. Patent applicant
(The Patent Office

9706862.1

04 APR 1997

3. Full name, address and postcode of the or of each applicant (underline all surnames)

William John Baillie-Hamilton
6 Prestwood terrace
Downshire Way
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Berks RG42 1XU

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

6979595001

4. Title of the invention

Lighting Device

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Olaf C Rock
Rock and Company
Trelawn
Cassington
Witney
Oxon OX8 1DN

Patents ADP number (if you know it)

30676003

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

See note (d))

no

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Continuation sheets of this form

Description

6

Claim(s)

-

Abstract

-

Drawing(s)

2

10. If you are also filing any of the following, state how many against each item.

Priority documents

-

Translations of priority documents

-

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

-

Request for preliminary examination and search (Patents Form 9/77)

-

Request for substantive examination (Patents Form 10/77)

-

Any other documents (please specify)

-

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date

4/4/97

12. Name and daytime telephone number of person to contact in the United Kingdom

Olaf C Rock 01865 880389

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Notes

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Figure 1A is a longitudinal vertical section of a first embodiment;

Figure 1B is an end view of the left hand end of the device shown in Figure 1A; and

Figure 1C is an end view of the right hand end of the device shown in Figure 1A; and

5 Figure 2 is a longitudinal vertical section of a second embodiment shown partially exploded.

FIGURES 1A TO C

10 A light emitting device 11 has a containment made up of first and second coaxial thick walled tube members (first member 12 and second member 13) with a common longitudinal axis 14. The first member 12 and second member 13 are of tungsten. Molybdenum is also suitable. First member 12 has a spigot 15 which serves to align with annular recess 16 of second member 13.

15 The first member 12 has a passage 17 extending through it in which is located a light conducting element 18 of quartz. The first member 12 is formed as a very close fit around the light conducting element 18 so that the first member 12 is in good heat transfer relationship with the element 18. Apart from the protection provided to the light conducting element by the first member 12 the heat transfer relationship
20 serves to avoid the maintenance of any hot spots in the light conducting element by providing for efficient heat removal. The first member 12 is provided with an array of fins along its outer side, typically fin 19, to provide for an enhanced area for radiating heat transferred to the first member 12.

25 Outer end 20 of the element 18 is located at the same level as outer surface 21 of first member 12. The outer surface 21 is provided with threaded holes 22 whereby a fibre optic harness and/or filter can be accurately aligned with and secured to the device 11.

30 The second member 13 has a second passage 23 extending through it in which is mounted units 25, 26 each made up of a quartz half rounded block each incorporating a conductor 25A, 26A. These conductors provide a pair of axial conductors for powering a light emitter as will be described hereafter. This configuration enables a good gas tight closure to be maintained while providing

electrical power supply to a lamp forming a part of the device 11 as will be described hereafter .

The assembled members 12, 13, their associated quartz member 18 and the pair of members 25, 26 when assembled serve to define a chamber 28 in which is located a light emitting element 29 in the form of a discharge lamp 30 having a pair of electrical terminals 31, 32 coupled to, respectively, conductors 25, 26 whereby the lamp 30 is energised. A polished mirror 33 is located in the chamber 28 at a suitable position relative to the light emitting element 20 to provide for light from the lamp 30 to be reflected back towards input face 34 of conducting element 18.

A further passage 37 extends radially through first member 12 and serves to provide means for pressurising and/or adding gas to the chamber 28 to enhance optical performance of the device 11.

In this embodiment end wall 34 of chamber 28 formed by the end of quartz member 18 and end wall 40 of members 25, 26 are shown as plane surfaces. In an alternative embodiment one or other or both of end walls corresponding to end walls 16, 40 can be shaped to enhance the optical functioning of the device.

Typically the end wall corresponding to wall 16 can be shaped to complement the shape of the adjacent face of the lamp 28 so as to enable the lamp to be set very close to the light input end of quartz member 18 so ensure that the light emitting element 29 is as close as possible to the light input end 16 of quartz member 18 for optimum transmission efficiency. Likewise a wall corresponding to end wall 40 provided by the conductors can be shaped and coated to provide an integral mirror to replace or supplement the mirror 33.

This exemplary embodiment shows a light emitting device making use of a casing in two or more parts (which can be insulated from one another) to enable an internally mounted light emitting means to be energised by way of the casing. The casing can contain gas or a solid based light emitting elements. The casings can be sealed in the case of a disposable device or be demountable so as to be capable of being serviced.

The light emitting elements can be a filament (such as a tungsten) run at an incandescent temperature or a gas discharge capsule in the form of a quartz container with electrodes with a solid salt which when activated melts to produce an arc in a gas.

FIGURE 2

Light emitting device 41 is made up of a quartz light conducting member 42 with a flanged end 42A and a quartz body member 43. The members 42, 43 are fused together along plane P to create a chamber 44 in which there is located a light emitting element in the form of a discharge lamp 45. From the rear of the body member 43 there extends a quartz axial member 46 having a concave inner face 47 having a mirror coating whereby to reflect light from the lamp 45 back towards face 48 of the chamber which provides a light input face to conducting member 42.

The axial member 46 serves to gas tightly house a conductor 49 for negative terminal 50 of lamp 45. The axial member 46 when the device is being fabricated also serves to provide a gassing duct for the chamber 44. Positive terminal 52 of the lamp 45 is supplied by a conductor 53 extending radially into chamber 44

The device 41 can be used either as shown as a substantially quartz bodied component or be shrouded with a close fitting container corresponding to members 12, 13 described in connection with Figure 1A. Which version is used depends upon the application. Use of a close fitting container as discussed earlier contributes to a device of great mechanical strength and also enables heat to be removed from the vicinity of the device.

The design of a device as considered in the exemplary embodiments can either allow for the device to be opened up to enable the light emitting device to be replaced in part or provide for a disposable device which is replaced as a unit when it ceases to function.

The device of Figure 2 is either used directly as a lamp unit or can be coupled to a fibre optic harness by means of the conducting member 42 or an extension thereof.

The embodiments refer to the use of quartz. However other specialised glass or glass like materials can be used depending on the application involved.

A casing when of metal or some other electrical conducting material can be coated or juxtaposed with insulating material to insulate or protect or seal the material relative to adjacent components.

The light conducting elements (18, Figure 1; 42, Figure 2) have not been described in detail. However they can be solid or made from fibres coated with material having a lower refractive index which are fused together to provide a rod and a seal to the containment housing through which the rod passes. The fibres may be drawn before or as a collection after fusing into rods which can be parallel or coned

If desired the rods can be further shaped into lenses or coated with material of varying refractive index either sequentially or radially. Coatings can be included on any part or parts of a collection of fibres or rods. The ends of the rods can be etched, cut or otherwise shaped and can incorporate micro lenses.

It is possible to provide a light conducting system of rods to provide a focusable light at their output which can be focused by remote control. Such control can also be used to control movement of lenses or mirrors mounted inside or outside the combined device and light conducting rods.

A wide range of applications can be achieved by use of the proposed light outputting device. In addition without energising the light emitting element the device can serve as a static reflector such as for 'cats eye' type applications serving to define carriageways, lanes or road boundaries for land vehicles and at air ports to guide aircraft when ground manoeuvring.

Fig1B

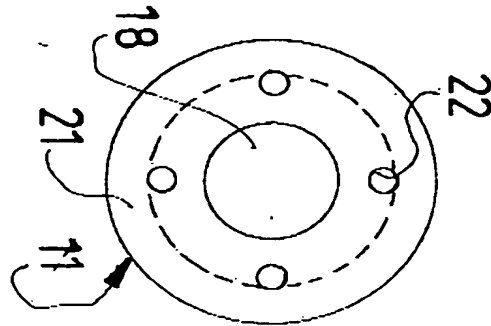


Fig1A

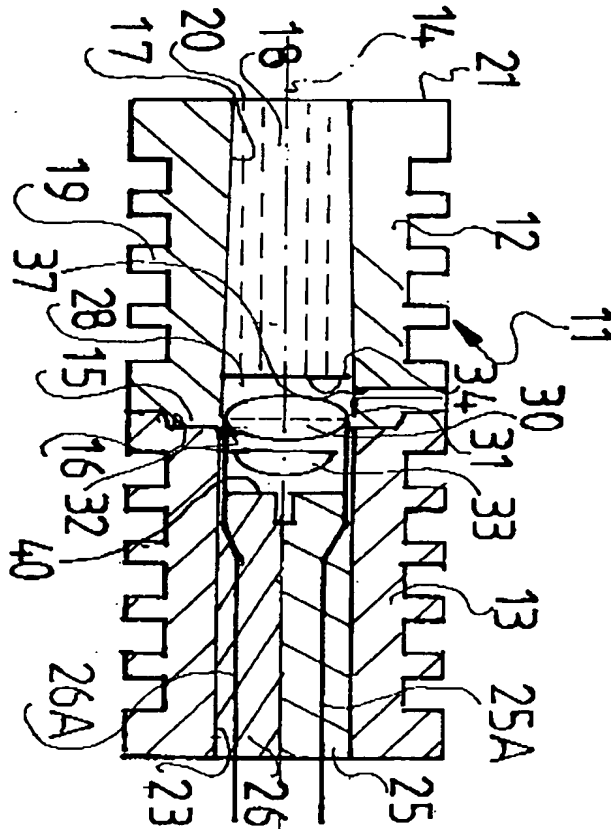


Fig1C

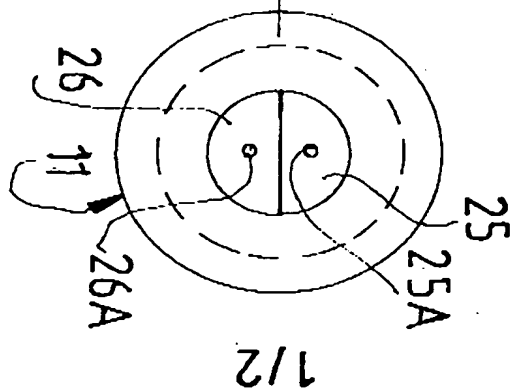
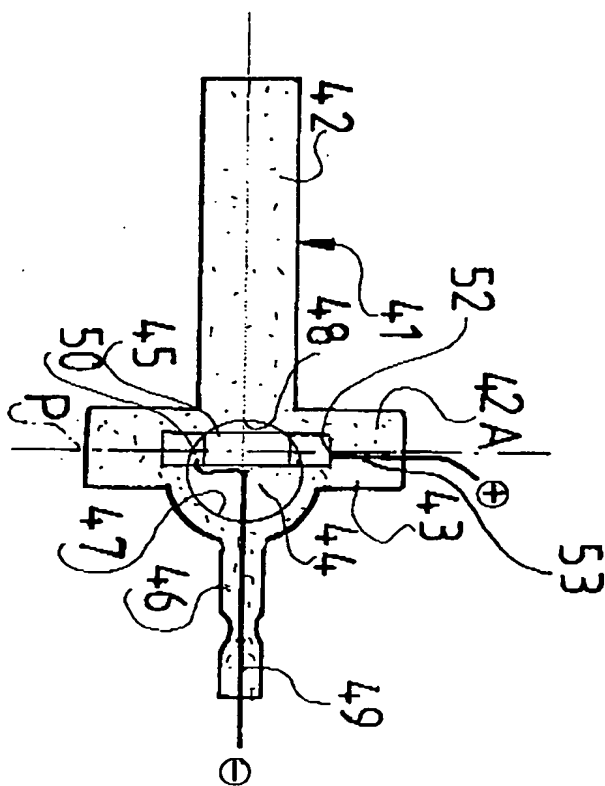


Fig 2



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